Appendix A

Ohio 2004
Integrated Water Quality Monitoring and Assessment Report

Supplemental Materials:

Consideration of Fish Consumption Advisory
Information in Compiling Ohio's Section 303(d)
List of Impaired Waters

Appendix A.1	Calculation of Fish Concentrations from Water Quality Standard Inputs
Appendix A.2	Mercury Data from 20 Lakes and Rivers in the Lake Erie Basin with Water Body Specific FCAs
Appendix A.3	List of FCA Waters in U.S. EPA Decision Document, Partial Approval/Disapproval of Ohio's 2002 303(d) List

Ohio Environmental Protection Agency
Division of Surface Water

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Appendix A.1 Calculation of Fish Concentrations From Water Quality Standard Inputs

Lake Erie Drainage Basin

	PCB	Hexachloro-benzene	Mercury	Lead
WQS	0.026 ng/l	0.45 ng/l	3.1 ng/l	190 ug/l
The following inputs on which the WQS are based are used to calculate fish concentrations*				
Reference dose (RfD) (non-cancer effect)	--	--	1.0 E^{-4} mg/kg/d	4.3 E^{-4} mg/kg/d
Cancer potency (q*1)	2.0 $(mg/kg/d)^{-1}$	1.6 $(mg/kg/d)^{-1}$	--	--
Cancer Risk Level	1 E^{-5}	1 E^{-5}	--	--
Body Weight	70 kg	70 kg	65 kg	70 kg
Fish Consumption	0.015 kg/d	0.015 kg/d	0.015 kg/d	0.015 kg/d
Relative Source Contribution (RSC)	--	--	0.8	--

*Sources. PCB, Hexachlorobenzene and Mercury: U.S. EPA. 1995. Great Lakes Water Quality Initiative Criteria Documents for the Protection of Human Health. EPA-820-B-95-006. March 1995. Lead: Michigan Department of Environmental Quality. Terrestrial toxicity and aesthetics values worksheet for lead. 7/10/97.

For carcinogens, Fish Concentration (mg/kg) =
[Cancer Risk Level / q*1 $((mg/kg/d)^{-1})$] x Body Weight (kg) / Fish Consumption (kg/d)

For noncarcinogens, Fish Concentration (mg/kg) =
RfD (mg/kg/d) x Body Weight (kg) x RSC / Fish Consumption (kg/d)

Lake Erie Drainage Basin PCB Fish Concentration

[1 E^{-5} / 2.0 $(mg/kg/d)^{-1}$] x 70 kg / 0.015 kg/d = 0.023 mg/kg = 23 ug/kg

Lake Erie Drainage Basin Hexachlorobenzene Fish Concentration

[1 E^{-5} / 1.6 $(mg/kg/d)^{-1}$] x 70 kg / 0.015 kg/d = 0.029 mg/kg = 29 ug/kg

Lake Erie Drainage Basin Mercury Fish Concentration

1.0 E^{-4} mg/kg/d x 65 kg x 0.8 / 0.015 kg/d = 0.35 mg/kg = 350 ug/kg

Lake Erie Drainage Basin Lead Fish Concentration

4.3 E^{-4} mg/kg/d x 70 kg / 0.015 kg/d = 2.0 mg/kg = 2,000 ug/kg

Appendix A.1 Calculation of Fish Concentrations From Water Quality Standard Inputs

Ohio River Drainage Basin

	PCB	Hexachloro-benzene	Mercury	Lead
WQS	1.7 ng/l	7.7 ng/l	12 ng/l	--
The following inputs on which the WQS are based are used to calculate fish concentrations*				
Reference dose (RfD) (non-cancer effect)	--	--	--	--
Cancer potency (q*1)	2.0 $(mg/kg/d)^{-1}$	1.6 $(mg/kg/d)^{-1}$	--	--
Cancer Risk Level	1 x 10^{-5}	1 x 10^{-5}	--	--
Body Weight	70 kg	70 kg	--	--
Fish Consumption	0.0065 kg/d	0.0065 kg/d	--	--
Relative Source Contribution (RSC)	--	--	--	--

*Source. PCB and Hexachlorobenzene: U.S. EPA. 1999. National Recommended Water Quality Criteria - Correction. EPA 822-Z-99-001. April 1999.

For carcinogens, Fish Concentration (mg/kg) =
[Cancer Risk Level / q*1 $((mg/kg/d)^{-1})$] x Body Weight (kg) / Fish Consumption (kg/d)

The Ohio River Drainage Basin water quality standard for mercury was calculated differently than other standards. Rather than being based on an RfD, it is based on the FDA Action Level in fish of 1.0 mg/kg.

Ohio River Drainage Basin PCB Fish Concentration

[1 E^{-5} / 2.0 $(mg/kg/d)^{-1}$] x 70 kg / 0.0065 kg/d = 0.054 mg/kg = 54 ug/kg

Ohio River Drainage Basin Hexachlorobenzene Fish Concentration

[1 E^{-5} / 1.6 $(mg/kg/d)^{-1}$] x 70 kg / 0.0065 kg/d = 0.067 mg/kg = 67 ug/kg

Ohio River Drainage Basin Mercury Fish Concentration

1.0 mg/kg (FDA Action Level) = 1,000 ug/kg

Appendix A.2 Mercury Data from 20 Lakes and Rivers in the Lake Erie Basin with Water Body Specific FCAs

Mercury concentrations present in fish tissue samples collected from 20 different lakes or rivers in the Lake Erie basin that have a water body specific FCA for mercury. Average values for species that exceeded the threshold of 350 ug/kg are highlighted. These five waters are listed as impaired due to the FCA and the existence of data showing concentrations above the value that the WQS criterion is based.

#	Water Body	Species	Average mercury (ug/kg)
1	Ashtabula River	Largemouth Bass	129
	Ashtabula River	Walleye	na
2	Auglaize River	Freshwater Drum	544
	Auglaize River	Smallmouth Bass	215
3	Black River	Freshwater Drum	339
4	Chagrin River	Rockbass	261
	Chagrin River	Smallmouth Bass	249
5	Conneaut Creek	Smallmouth Bass	310
6	Cuyahoga River	Common Carp	375
	Cuyahoga River	White Sucker	269
7	East Branch Black River	Rockbass	248
	East Branch Black River	Smallmouth Bass	355
	East Branch Black River	Yellow Bullhead	219
	East Branch Black R	Common Carp	302
8	Findley Lake	Largemouth Bass	263
9	Grand River	Freshwater Drum	223
	Grand River	Largemouth Bass	237
	Grand River	Silver Redhorse	260
	Grand River	Smallmouth Bass	301
	Grand River	Walleye	499
	Grand River	Yellow Bullhead	270
10	Huron River	Freshwater Drum	277
11	Maumee River	Common Carp	182
	Maumee River	Smallmouth Bass	295
12	New Lyme Lake	Largemouth Bass	525
13	Sandusky River	Channel Catfish	218
	Sandusky River	Channel Catfish	328
	Sandusky River	Largemouth Bass	261
14	St. Joseph River	Channel Catfish	308
15	St. Mary's River	Freshwater Drum	254
	St. Mary's River	Northern Pike	108
	St. Mary's River	Saugeye	241
16	Tiffin River	Northern Pike	250
	Tiffin River	Smallmouth Bass	na
17	Tymochtee Creek	Channel Catfish	312
18	Vermillion River	Smallmouth Bass	285
19	West Branch Black R	White Sucker	317

Appendix A.3 List of FCA Waters in U.S. EPA Decision Document, Partial Approval/Disapproval of Ohio's 2002 303(d) List

List of waters added to Table 6 (Category 5) of Ohio's 2002 Integrated Report based on sport fish consumption advisories in U.S. EPA decision document, partial approval/disapproval of Ohio's 2002 303(d) list. Information in this Table reproduced from the U.S. EPA original. Two original entries are in error, and the corrected information is presented (see the shaded boxes). The status of each water body in Ohio's 2004 Integrated Report is also shown under a new column. See Sections 7 and 8 of the Ohio 2004 IR for additional information.

			Listed Category			
Water body AU (HUC 11)	Description of water body	FCA	Ohio EPA 2002 IR	U.S. EPA 2003	Ohio EPA 2004	Pollutant
04100003-020	W. Br. St. Joseph River	one meal per week all species	2	5	5	PCB's
04100004-030	St. Mary's River	one meal per week (fresh water Drum, Norther Pike, Saugeye)	3	5	3	Mercury
04100010-050	Portage River	~~one meal per 2 months carp~~ one meal per month	3	5	5	PCB's
04100012-050	Vermillion River (headwaters to upstream East Branch)	One meal per month Small Mouth Bass	3	5	5	Mercury
04100012-060	Vermillion River (upstream East Branch to mouth)	One meal per month Small Mouth Bass	3	5	5	Mercury
04110001-030	E. Br. Black River (headwaters to downstream Coon Creek)	One meal per month Rock Bass, Smallmouth Bass, Yellow Bullhead	4B	5	5	Mercury
05040001-040	Sandy Creek (headwaters to downstream Still Fork)	One meal per month Carp	3	5	5	PCB's
05090103-040	Little Scioto River (upstream Rocky Fork to mouth); Ohio River tribs (downstream 8-digit divide)	One meal per month Rock Bass, Spotted Bass	3	5	5	Mercury

			Listed Category			
Water body AU (HUC 11)	Description of water body	FCA	Ohio EPA 2002 IR	U.S. EPA 2003	Ohio EPA 2004	Pollutant
05090202-010	Little Miami River[1] (headwaters to upstream Massies Creek)	One meal per month for Sauger	4A	5	4A	Mercury
		one meal per week of Channel Catfish, Smallmouth Bass				~~PCB's~~ Lead
05090101-100	Symmes Creek (downstream Buffalo Creek to mouth); Ohio River Tribs (Symmes Cr, to Big Sandy R.)	One meal per month Freshwater Drum, Sauger (area under the advisor is from St. Rt. 41 to Waterloo to the Ohio River)	3	5	3	Mercury
05090202-020	Little Miami River [2] (upstream Massies Creek to downstream Beaver Creek)	One meal per month entire length Sauger,	4A	5	5	Mercury
		one meal per week for Channel Catfish, Smallmouth Bass				Lead
05090202-030	Little Miami River [3] (downstream Beaver Creek to upstream Caesar Creek)	One meal per month entire length Sauger, one meal per week for Channel Catfish, Smallmouth Bass	4A	5	4A	Mercury Lead
	Grand River Mainstem (downstream Mill Creek to mouth)	One meal per Month Carp 22" and larger, Freshwater Drum,	4B	5	5	PCB's
		Largemouth Bass, Smallmouth Bass, Yellow Bull head , Silver Redhorse and Walleye form Tote St. near Austinburg				Mercury
	Hocking River Mainstem (downstream Scott Creek to Mouth)	One meal per month Carp	3	5	5	PCB's

			Listed Category			
Water body AU (HUC 11)	Description of water body	FCA	Ohio EPA 2002 IR	U.S. EPA 2003	Ohio EPA 2004	Pollutant
	Walhonding River Mainstem (entire Length)	One meal per month Channel Catfish, One meal per week Saugeye, Smallmouth Bass	2	5	5	PCB's
	Paint Creek (downstream Rocky Fork to mouth)	One meal per Month Largemouth Bass	2	5	5	Mercury
	Stillwater River Mainstem (downstream Greenville Creek to mouth)	One meal per Month Channel Catfish, Smallmouth Bass	4C	5	5	Mercury

1 In appendix C of the Integrated Report Ohio identifies cause of impairment to be metals, Unionized Ammonia, Nutrients, Organic Enrichment/DO, Flow Alteration, Other Habitat Alterations, Pathogens. Appendix C also indicates that there is a FCA for this section of the Little Miami. Although a TMDL was developed for this section it did not cover the FCA or Pathogens and therefore should remain on the list in Category 5.

2 In appendix C of the Integrated Report Ohio identifies cause of impairment to be metals, Unionized Ammonia, Nutrients, Other Habitat Alterations, Pathogens, Siltation, unknown Toxicity. Appendix C also indicates that there is a FCA for this section of the Little Miami. Although a TMDL was developed for this section it did not cover the FCA or Pathogens and therefore should remain on the list in Category 5.

3 In appendix C of the Integrated Report Ohio identifies cause of impairment to be Unionized Ammonia, Nutrients, Chlorine, Nutrients, Organic Enrichment/DO, Flow Alterations, Suspended Solids. Appendix C also indicates that there is a FCA for this section of the Little Miami. Although a TMDL was developed for this section it did not cover the FCA and therefore should remain on the list in Category 5.